REMARKS

Applicant intends this response to be a complete response to the Examiner's **11 March 2005** Non-Final Office Action. Applicant has labeled the paragraphs in his response to correspond to the paragraph labeling in the Office Action for the convenience of the Examiner.

Rejections Under 35 U.S.C. §102

Claims 1-2, 6-8, 10, 13-14, 17 and 19-27 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Wreyford (US5152963). Applicant traverses and respectfully requests reconsideration based on the above claim amendments, if any, and the remarks presented herein.

Wreyford, by his own admission, does not detect sulfur below 500 ppb or 0.5 ppm. Wreyford at Col. 1, ll. 44-50. Moreover, Wreyford, by his own admission, asserted that atmospheric nitrogen is not converted to nitrogen oxides during combustion in the Wreyford system:

> Free nitrogen typically is not included in the sample. **That is, atmospheric nitrogen is so nearly inert that combination [combustion] occurs at only extraordinarily high temperatures, those temperatures [are] above the range mentioned above.** It is therefore desirable to operate the combustion means at a temperature sufficiently high to combust all the sulfur, and all the nitrogen in compound form. The temperature is kept low enough that free nitrogen, typically atmospheric nitrogen, is not combusted.

Wreyford at Col. 3, ll. 7-16 (emphasis added).

In fact, in the absence of RN and/or RSN (analytes that contain bound nitrogen) where only sulfur would be present, Wreyford does not pass the sample through the ozone chamber:

> If one is certain that the sample includes only nitrogen or sulfur but not both, then the equipment not needed can simply be turned off. In that instance, the valve 24 can be conveniently switched to deliver the sample to the first of interest for performing only that test.

Wreyford at Co. 6, ll. 4-9.

Additionally, Wreyford states that in the absence of sulfur, the sulfur detection system will not detect a response: "Thus, if there is no SO_2 present, the PMT 34 will not have a measured output. It will not observe anything." Wreyford at Co. 5, ll. 21-23. This statement is simply wrong. The present application clearly demonstrates that this assertion is wrong. In the presence of a fuel such as iso-octane, a clear response is seen by the PMT in the sulfur UV chamber, see Figure 5 and paragraph 41. This response increases with increasing concentrations of atmospheric nitrogen proving unequivocally that oxidation of atmospheric nitrogen produces the interfering agent for detecting sulfur at level at or below 100 ppb.

Although Wreyford uses ozone, Wreyford does not use ozone to remove interfering NO during SO_2 UV fluorescence. Wreyford uses ozone to detect nitrogen, but not to remove interfering nitrogen species for improving SO_2 UV fluorescence detection. Thus, Wreyford does not disclose the use of ozone or hydrogen peroxide to eliminate NO interference with SO_2 UV fluorescence detection at sulfur concentrations at or below 100 ppb. Wreyford did not disclose that sub 100 ppb detection of sulfur in analytes containing sulfur, but no nitrogen, as such low levels were not possible due to NO formed from atmospheric nitrogen oxidation in the combustion chamber formed in the presence of a fuel source.

As to **claim 1**, Wreyford does not disclose an apparatus including an UV interference reduction system to permit reliable SO_2 UV fluorescence detection of sulfur at levels at or below 100 ppb. As to **claim 2**, Wreyford does not disclose an apparatus including an UV interference reduction system that is an ozone generator that is designed to remove NO without at the same time analyzing for NO and that permits reliable SO_2 UV fluorescence detection of sulfur at levels at or below 100 ppb. The ozone generator of Wreyford is to facilitate the detection of nitrogen in the analyte, and not to eliminate interference in SO_2 UV fluorescence detection of sulfur at levels at or below 100 ppb. In fact, Wreyford did not even recognize that atmospheric nitrogen would interfere with SO_2 UV fluorescence detection of sulfur at levels at or below 100 ppb.

As to **claim 6**, Wreyford does not disclose an apparatus including an UV interference reduction system that is an ozone chamber where the ozone in introduced into the transfer tube to permit reliable SO_2 UV fluorescence detection of sulfur at levels at or below 100 ppb. The use of ozone in this manner would wholly eviscerate the teaching of Wreyford. Wreyford used ozone to detect NO not to remove it. Moreover, the ozone induced chemiluminescence of NO is so fast that introducing the ozone into the transfer tube would deny the Wreyford apparatus the ability to analyze for nitrogen.

As to **claim 7**, Wreyford does not disclose an apparatus including an UV interference reduction system that is an ozone chamber to permit reliable SO_2 UV fluorescence detection of sulfur at levels at or below 100 ppb that does not in turn permit the detection of nitrogen via ozone induced chemiluminescence of NO. Wreyford does not teach an ozone chamber adapted to eliminate interfering nitrogen oxide formed from nitrogen gas during analyte oxidation.

As to **claim 8**, Wreyford does not disclose an apparatus including an UV interference reduction system that is a first sub-chamber of a bifurcated SO_2 UV fluorescence detection chamber to permit reliable SO_2 UV fluorescence detection of sulfur at levels at or below 100 ppb.

As to **claim 10**, Wreyford does not disclose an apparatus of claim 10 because it does not including an UV interference reduction system to permit reliable SO_2 UV fluorescence detection of sulfur at levels at or below 100 ppb.

As to **claim 13**, Wreyford does not disclose a method using NO reactive agents selected from the group consisting of ozone and hydrogen peroxide designed to permit reliable SO_2 UV fluorescence detection of sulfur at levels at or below 100 ppb.

As to **claim 14**, Wreyford does not disclose a method using an NO reactive agent comprising ozone designed to permit reliable SO_2 UV fluorescence detection of sulfur at levels at or below 100 ppb.

As to **claim 17,** Wreyford does not disclose a method where ozone is introduced into the oxidizing sample (introduced into the combustion tube) to permit reliable SO_2 UV fluorescence detection of sulfur at levels at or below 100 ppb.

As to **claim 19**, Wreyford does not disclose a method of claim 19 because it does not use NO reactive agents to permit reliable SO_2 UV fluorescence detection of sulfur at levels at or below 100 ppb.

As to **claim 20**, Wreyford does not disclose an apparatus of claim 20 because it does not including an UV interference reduction system to permit reliable SO_2 UV fluorescence detection of sulfur at levels at or below 100 ppb.

As to **claim 21**, Wreyford does not disclose a method including the step of introducing an UV interference reduction agent into the system prior to SO_2 UV fluorescence detection to permit reliable SO_2 UV fluorescence detection of sulfur at levels at or below 100 ppb.

As to **claim 22**, Wreyford does not disclose a method where the UV interference reduction agent permits reliable SO_2 UV fluorescence detection of sulfur at levels below 50 ppb.

As to **claim 23**, Wreyford does not disclose a method including the step of introducing an UV interference reduction agent into the system prior to SO_2 UV fluorescence detection to permit reliable SO_2 UV fluorescence detection of sulfur at levels at or below 100 ppb regardless of the nature of the oxidizing agent.

As to **claim 24**, Wreyford does not disclose a method including the step of adjusting the ozone concentration of minimize interference to permit reliable SO_2 UV fluorescence detection of sulfur at levels at or below 100 ppb.

As to **claim 25**, Wreyford does not disclose an apparatus including an UV interference reduction system to permit reliable SO_2 UV fluorescence detection of sulfur at levels below 50 ppb.

As to **claim 26**, Wreyford does not disclose an apparatus including an UV interference reduction system to permit reliable SO_2 UV fluorescence detection of sulfur at levels at or below 100 ppb, regardless of the nature of the oxidizing agent.

As to **claim 27**, Wreyford does not disclose an apparatus including an UV interference reduction system that is an ozone generator capable of generating variable amount of ozone to minimize interference and to permit reliable SO_2 UV fluorescence detection of sulfur at levels at or below 100 ppb.

Because: (1) Wreyford does not disclose the detection of sulfur below 0.5 ppm or 500 ppb, (2) Wreyford teaches that in the absence of chemically bound nitrogen (RN or RNS), sulfur can be directly measured without the presence of ozone, and (3) without a system for removing NO produced during analyte oxidation, sulfur cannot be analyzed reliably at or below 100 ppb using SO_2 UV fluorescence detection, Wreyford cannot anticipate the present claims. Applicant, therefore, respectfully requests withdrawal of this section 102(b) rejection.

Rejections Under 35 U.S.C. §103

Claims 3-5, 9, 15-16 and 18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Wreyford. Applicant traverses and respectfully requests reconsideration based on the above claim amendments, if any, and the remarks presented herein.

Applicant repeats all the discussions concerning Wreyford here. It is clear, that Wreyford teach directly away from the claims of present invention. Wreyford states that nitrogen gas is not oxidized in the Wreyford apparatus. Moreover, the problem with detecting sulfur in the sub 100 ppb range has plagued the industry for a very long time and no solution has been proposed until now because no one understood what was causing the problem, *i.e.*, the oxidation of trace nitrogen gas in analyte streams that do not include bound nitrogen. Applicant, therefore, respectively requests withdrawal of this section 103(a) rejection.

As to **claim 3**, Wreyford does not disclose an apparatus including an UV interference reduction system that is an ozone generator where ozone is introduced into the oxidizing agent prior to analyte combustion and to permit reliable SO_2 UV fluorescence detection of sulfur at levels at or below 100 ppb.

As to **claim 4**, Wreyford does not disclose an apparatus including an UV interference reduction system that is an ozone generator where ozone is introduced into the oxidizing zone during

analyte combustion and to permit reliable SO_2 UV fluorescence detection of sulfur at levels at or below 100 ppb.

As to **claim 5**, Wreyford does not disclose an apparatus including an UV interference reduction system that is an ozone generator where ozone is introduced into the oxidizing zone at it distal end just after analyte combustion and to permit reliable SO_2 UV fluorescence detection of sulfur at levels at or below 100 ppb.

As to **claim 9**, Wreyford does not disclose an apparatus including an UV interference reduction system and a nitrogen gas removal system to permit reliable SO_2 UV fluorescence detection of sulfur at levels at or below 100 ppb. In fact, Wreyford make absolutely no mention of a nitrogen gas removal system.

As to **claim 15**, Wreyford does not disclose a method where the ozone is introduced into the oxidizing agent prior to analyte combustion and to permit reliable SO_2 UV fluorescence detection of sulfur at levels at or below 100 ppb.

As to **claim 16**, Wreyford does not disclose a method where the ozone is introduced into the oxidizing sample during analyte combustion and to permit reliable SO_2 UV fluorescence detection of sulfur at levels at or below 100 ppb.

As to **claim 18**, Wreyford does not disclose a method including contacting the oxidizing agent with a nitrogen gas removal reagent and introducing a UV interference reduction agent to permit reliable SO_2 UV fluorescence detection of sulfur at levels at or below 100 ppb.

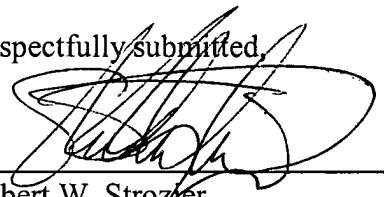
Because: (1) Wreyford does not disclose the detection of sulfur below 0.5 ppm or 500 ppb, (2) Wreyford teaches that in the absence of chemically bound nitrogen (RN or RNS), sulfur can be directly measured without the presence of ozone, and (3) without a system for removing NO produced during analyte oxidation, sulfur cannot be analyzed reliably at or below 100 ppb using SO_2 UV fluorescence detection, Wreyford cannot anticipate the present claims. Applicant, therefore, respectfully requests withdrawal of this section 103(a) rejection.

Having fully responded to the Examiner's Non-Final Office Action, Applicant respectfully urges that is application be passed onto allowance.

If it would be of assistance in resolving any issues in this application, the Examiner is kindly invited to contact applicant's attorney Robert W. Strozier at 713.977.7000

Date: **January 17, 2006**

Respectfully submitted,



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